

CLAIMS:

1. A fuel cell system comprising:

a fuel cell configured to be supplied with a fuel gas containing hydrogen and an oxidative gas containing oxygen;

5 an air supplier configured to supply air to the fuel cell;

a sucked air temperature detector configured to detect a temperature of air sucked by the air supplier;

an atmospheric pressure detector configured to detect an atmospheric pressure; and

10 a control apparatus configured to control an operation of the fuel cell,

wherein the control apparatus comprises an operation restrictor configured to: restrict an operation of the fuel cell so that the temperature of air delivered from the air supplier is kept from exceeding a predetermined upper limit, based on the sucked air temperature detected by the sucked air temperature detector and the atmospheric pressure detected by the atmospheric pressure detector; and mitigate the restriction of the operation under a predetermined condition.

2. The fuel cell system as claimed in claim 1, wherein the control apparatus further comprises a delivery pressure upper limit setter configured to set an upper limit of a delivery pressure of the air supplier so that a temperature of air delivered by the air supplier is kept from exceeding a predetermined upper limit, based on the sucked air temperature detected by the sucked air temperature detector and the atmospheric pressure detected by the atmospheric pressure detector; and

25 wherein the operation restrictor is configured to control the delivery pressure of the air supplier so that the delivery pressure is kept from exceeding the upper limit.

3. The fuel cell system as claimed in claim 2, wherein the control apparatus is configured to calculate an electric power upper limit or electric current upper limit extractable from the fuel cell based on the delivery pressure upper limit acquired from the delivery pressure upper limit setter, and

35 wherein the operation restrictor is configured to control power generation so that the power generation is kept from exceeding the electric power upper limit or electric current upper limit.

4. The fuel cell system as claimed in claim 1, further comprising a delivered air temperature detector configured to detect a temperature of air delivered from the air supplier; and

5 wherein the operation restrictor is configured to control the air supplier so that the delivered air temperature detected by the delivered air temperature detector is kept from exceeding a predetermined value.

5. The fuel cell system as claimed in claim 1, further comprising: an outside air temperature detector configured to detect an outside air temperature, and a sucked air temperature change predictor configured to predict a change of a sucked air temperature; and

10 wherein operation restriction is transiently mitigated, when the sucked air temperature detected by the sucked air temperature detector is higher than the outside air temperature by a predetermined amount, and when the sucked air temperature change predictor has predicted a drop of the sucked air temperature.

6. The fuel cell system as claimed in claim 5, wherein the sucked air temperature change predictor is configured to detect starting from stoppage of a vehicle or acceleration in an extremely low speed state of the vehicle.

20 7. The fuel cell system as claimed in claim 5, wherein the mitigation of operation restriction is rejected when the delivered air pressure of the air supplier is increasing at a predetermined change rate or larger.

8. The fuel cell system as claimed in claim 5, wherein the mitigation of operation restriction is rejected when the sucked air temperature of the air supplier has failed to drop by a predetermined amount after a predetermined elapsed time.

25 9. The fuel cell system as claimed in claim 1, wherein the upper limit of the delivered air temperature is settled based on that one of the air supplier, the fuel cell, and a humidifier configured to humidify air to be supplied to the fuel cell, which has the lowest thermally allowable temperature.

30 10. The fuel cell system as claimed in claim 2, wherein the mitigation of operation restriction is conducted based on heat capacities of the air compressor and components downstream thereof, for a period of time during which the components are raised in temperature up to the thermally allowable temperatures, respectively.

11. The fuel cell system as claimed in claim 4, wherein the

mitigation of operation restriction is conducted based on heat capacities of the air compressor and components downstream thereof, for a period of time during which the components are raised in temperature up to the thermally allowable temperatures, respectively.

5 12. The fuel cell system as claimed in claim 3, wherein the mitigation of operation restriction is conducted to increase electric power or electric current to be extracted, while allowed as a time rating for the restricted pressure of delivered air.

 13. A fuel cell system comprising:

10 a supply system configured to supply utilities containing an oxidizer;
 a fuel cell configured to generate electric power by using the utilities supplied from the supply system; and

 a controller configured to control the supply system to operate the fuel cell,

15 wherein the controller comprises:

 a first control part configured to restrict a supply condition of the oxidizer; and

 a second control part configured to mitigate the restriction of the supply condition, depending on an operational state of the supply system.

20 14. The fuel cell system as claimed in claim 13, wherein the first control part has a limit value for restricting the supply condition, and the second control part is configured to mitigate the restriction by correcting the limit value.

25 15. The fuel cell system as claimed in claim 13, provided in a vehicle having the fuel cell as a main electric-power source, wherein the controller has a third control part configured to supplement the mitigation of restriction depending on an operational state of the vehicle.

 16. A fuel cell system comprising:

30 a fuel cell configured to be supplied with a fuel gas containing hydrogen and an oxidative gas containing oxygen;

 an air supply means for supplying air to the fuel cell;

 a sucked air temperature detection means for detecting a temperature of air sucked by the air supply means;

35 an atmospheric pressure detection means for detecting an atmospheric pressure; and

 a control apparatus configured to control an operation of the fuel

cell;

wherein the control apparatus comprises an operation restricting means for: restricting an operation of the fuel cell so that the temperature of air delivered from the air supply means is kept from exceeding a predetermined upper limit, based on the sucked air temperature detected by the sucked air temperature detection means and the atmospheric pressure detected by the atmospheric pressure detection means; and mitigating the restriction of the operation under a predetermined condition.

17. A fuel cell system comprising:

a supply system configured to supply utilities containing an oxidizer; a fuel cell configured to generate electric power by using the utilities supplied from the supply system; and

a controller configured to control the supply system to operate the fuel cell;

wherein the controller comprises:

a first control means for restricting a supply condition of the oxidizer; and

a second control means for mitigating the restriction of the supply condition, depending on an operational state of the supply system.

18. A control method for a fuel cell system comprising a fuel cell configured to be supplied with a fuel gas containing hydrogen and an oxidative gas containing oxygen, an air supplier configured to supply air to the fuel cell, a sucked air temperature detector configured to detect a temperature of air sucked by the air supplier, an atmospheric pressure detector configured to detect an atmospheric pressure, and a control apparatus configured to control an operation of the fuel cell, the method comprising:

restricting an operation of the fuel cell so that the temperature of air delivered from the air supplier is kept from exceeding a predetermined upper limit, based on the sucked air temperature detected by the sucked air temperature detector and the atmospheric pressure detected by the atmospheric pressure detector; and mitigating the restriction of the operation under a predetermined condition.

19. A control method for a fuel cell system comprising a supply system configured to supply utilities containing an oxidizer, and a fuel cell configured to generate electric power by using the utilities supplied from the

supply system, to control the supply system to operate the fuel cell, the method comprising:

restricting a supply condition of the oxidizer; and

5 mitigating the restriction of the supply condition, depending on an operational state of the supply system.